RESEARCH DEPARTMENT

LOW-POWER V.H.F./F.M. TRANSMITTERS—GALASHIELS AREA SITE TESTS

Report No. K-120

(1956/38)

THE BRITISH BROADCASTING CORPORATION
ENGINEERING DIVISION

RESEARCH DEPARTMENT

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SUMMARY

Two sites were tested in the Galashiels area. It was found that Lindean Moor would provide the better service and this site is therefore recommended.

Tests on the reception of television sound indicated the probability of a reliable signal from the Kirk o' Shotts v.h.f. transmissions for rebroadcasting from Lindean Moor.

1. INTRODUCTION.

In the v.h.f. plan for national coverage provision is made for f.m. transmissions to serve the Galashiels area, including the valleys of the Tweed and Teviot, with the Home, Third and Light programmes on frequencies of 93·5 Mc/s, 91·3 Mc/s and 89·1 Mc/s respectively. Each programme will use two 1 kW transmitters in parallel, their outputs being combined to drive a four-tier slot aerial elevated 302 ft (92 m) above ground level giving an effective radiated power (e.r.p.) of 5·6 kW.

2. GENERAL.

The two sites tested were Lindean Moor, approximately 2 miles (3 km) east-north-east of Selkirk, and Dryden Hill, approximately 3·5 miles (5 km) south of Selkirk.

The test transmissions were made on a frequency of 91·68 Mc/s from horizontally polarised crossed dipole transmitting aerials mounted on the top of a 110 ft (33 m) mast. Each dipole was provided with a feeder from the transmitter and only one dipole was energised at a time.

The field strength measured has been corrected to correspond to that for an omnidirectional aerial with an e.r.p. of 5·6 kW, and height-gain measurements made with a balloon provided a basis for transmitting aerial height correction. The measurements were made with a receiving aerial 11·5 ft (3·5 m) above ground level but they have been corrected to correspond to the value expected 30 ft (9·2 m) above ground level.

The field strength of the Kirk o' Shotts television sound transmitter was recorded during the course of the tests, using an aerial 30 ft (9·2 m) above ground level, and height-gain observations were made with the balloon to determine the field strength that might be expected at greater aerial heights.

Particulars of the two sites are summarised in the Appendix.

3. RESULTS.

Table 1 shows the field strength in the principal towns from both sites for an aerial elevated 302 ft (92 m) above ground level and an e.r.p. of 5·6 kW. The readings for the Dryden Hill site are incomplete because when it was found that the results from this site were consistently inferior to those of Lindean Moor further measurements were abandoned.

TABLE 1

Field Strength in mV/m at 30 ft (9·2 m) AGL
302 ft (92 m) aerial, 5·6 kW e.r.p.

Town	Lindean Moor			Dryden Hill		
	Max.	Median	Min.	Max.	Median	Min.
Belford	0·6	<0·3	–			
Berwick upon Tweed	3·8	0·75	<0·5			
Coldstream	9·4	3·8	2·1	6·3	1·3	0·5
Duns	2·5	1·5	0·9			
Earlston	3·4	1·5	0·9	0·9	0·56	0·4
Eyemouth	0·9	<0·6	–			
Galashiels	>100	28	2·5	94	6·7	0·7
Gordon	8·4	5·3	4·2	5·0	1·4	0·8
Greenlaw	7·1	4·0	3·2			
Hawick	7·5	1·1	<0·3	5·3	0·75	<0·2
Jedburgh	2·8	0·9	0·4			
Kelso	13	6·3	3·0	8·9	3·4	1·3
Melrose	17	3·4	0·9	3·4	0·9	0·3
Peebles	1·0	0·5	<0·3			
Selkirk	>100	71	12	94	24	5·3
Walkerburn	0·6	<0·3	–			
Wooler	0·7	<0·3				

It will be seen from Table 1 that Hawick, the largest town in the area, would receive a median field strength of 1·1 mV/m which is quite adequate. The minimum measured field strength (<0·3 mV/m) shows, however, that a few parts of the town may be below the limit of a second grade service (0·25 mV/m). The corresponding field strengths from Dryden Hill are 0·75 mV/m and <0·2 mV/m respectively. Galashiels (28 mV/m), Kelso (6·3 mV/m), Melrose (3·4 mV/m) and Selkirk (71 mV/m) will all receive an excellent service from Lindean Moor while Jedburgh (0·9 mV/m) and Peebles (0·5 mV/m) should, on the whole, be provided with a reasonable grade of service. In both these towns electrical interference may, however, mar reception in some low-lying areas where the field strength would be relatively weak.

Fig. 1 (map F.101) shows the 1·0 mV/m and 0·25 mV/m field strength contours for the Lindean Moor site. The data from the Dryden Hill site were insufficient for the construction of a contour map.

Table 2, compiled by Engineering Information Department, gives the population estimated within the 1·0 mV/m and 0·25 mV/m contours shown in Fig. 1.

Fig. 1

LINDEAN MOOR

Derived from site test measurements

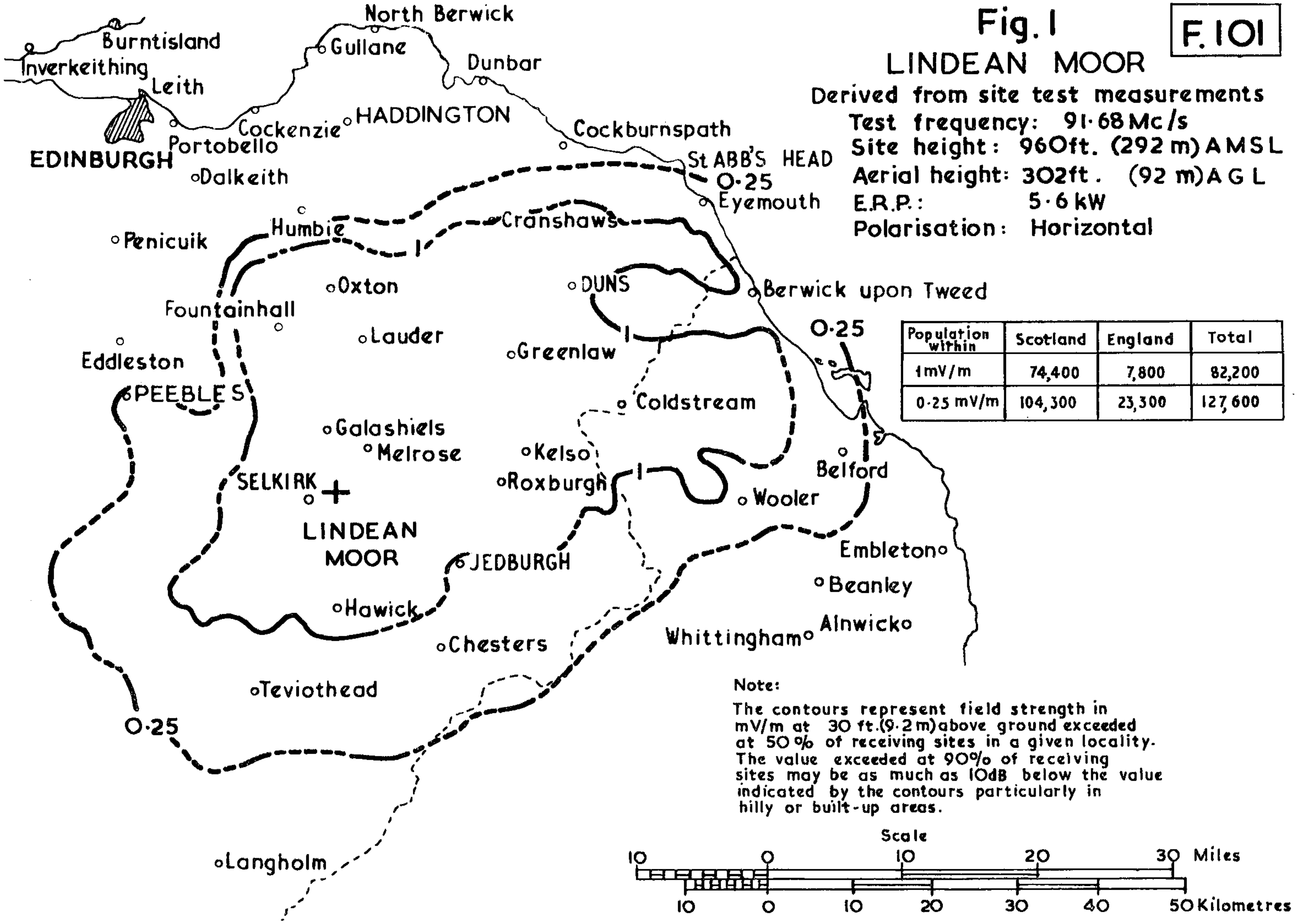
Test frequency: 91·68 Mc/s

Site height: 960ft. (292 m) AMSL

Aerial height: 302ft. (92 m) A G L

E.R.P.: 5·6 kW

Polarisation: Horizontal



Population within	Scotland	England	Total
1 mV/m	74,400	7,800	82,200
0·25 mV/m	104,300	23,300	127,600

Note:

The contours represent field strength in mV/m at 30 ft. (9·2 m) above ground exceeded at 50% of receiving sites in a given locality. The value exceeded at 90% of receiving sites may be as much as 10dB below the value indicated by the contours particularly in hilly or built-up areas.

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TABLE 2

Population within	Scotland	England	Total
1·0 mV/m	74,400	7,800	82,200
0·25 mV/m	104,300	23,300	127,600

4. THE RECEPTION OF KIRK O' SHOTTS AT LINDEAN MOOR.

The field strength of the Kirk o' Shotts television sound transmitter (e.r.p. 25 kW) was recorded with a receiving aerial 30 ft (9·2 m) above ground level. The total recording time was 96 hours. In addition, height-gain measurements were made and these indicate that the median field strength at the top of the proposed mast (350 ft (107 m) above ground level) may be expected to be 6 dB greater than at 30 ft (9·2 m).

The observed results, corrected for height, frequency and power, are shown as a function of percentage time in Table 3.

TABLE 3

Field Strength at Lindean Moor
from a 120 kW V.H.F./F.M. Transmitter at Kirk o' Shotts

Percentage Time	50	60	70	80	90	95	98	99	99·5	100
Field Strength (dB rel. 1μV/m) for a receiving aerial 350 ft (107 m) above ground level	62·5	62	61·3	60·5	59·7	59·3	58·5	57·5	56·5	53

Although the field strength level is sufficient for reliable rebroadcasting no account has been taken of the possible interference which may arise in the presence of the local transmitters.

5. CONCLUSIONS.

Lindean Moor is the best site available for an f.m. transmitter to serve the population in the Tweed and Teviot valleys and it is recommended that the transmitter be built on this site. The signals from the Kirk o' Shotts f.m. transmitters are expected to be sufficiently reliable at Lindean Moor for rebroadcasting purposes.

APPENDIX

Lindean Moor

Site Height	960 ft (292 m) AMSL
Latitude	55° 33' 27" N
Longitude	02° 47' 24" W
National Grid Reference	36(NT)/50122959

Dryden Hill

Site Height	994 ft (302 m) AMSL
Latitude	55° 30' 35" N
Longitude	02° 50' 25" W
National Grid Reference	36(NT)/470244

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